STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Hydro-electric power stations		**1010314381010326976**
Field of study: **Power Engineering**	Profile of study (general academic, practical): **(brak)**	Year /Semester: **4 / 8**
Elective path/specialty: **Ecological Source of Electrical Energy**	Subject offered in: **polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time): **part-time**	
No. of hours: Lecture: **9** Classes: **-** Laboratory: **-** Project/seminars: **9**		No. of credits: **3**
Status of the course in the study program (Basic, major, other): **(brak)**	(university-wide, from another field): **(brak)**	
Education areas and fields of science and art: **technical sciences**, **Technical sciences**		ECTS distribution (number and %): **3 100%**, **3 100%**

Responsible for subject / lecturer:

Prof. dr hab. inż. Władysław Opydo
email: wladyslaw.opydo@put.poznan.pl
tel. 616652685
Elektryczny
ul. Piotrowo 3A, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of physics, chemistry, electrical engineering and power engineering
2	**Skills**	Spreadsheet service. Ability to effectively self-education in a field related to the chosen field of study.
3	**Social competencies**	Is aware of the need to broaden their competence, willingness to work together as a team.

Assumptions and objectives of the course:

Acquainted with the operation, construction, design and operation of hydroelectric power.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has a basic and systematic knowledge of the construction and operation of hydroelectric power plants and the principles of design of small hydropower - [K_W08+, K_W09++, K_W20++]
2. Knows design methodologies of small hydropower plants - [K_W09++]

Skills:

1. It can compare different variants of the concept of the construction of of small hydropower plants due to the given criteria - [KU_01+, KU_02+, KU_10++]

Social competencies:

1. Is aware of the responsibility of the engineer-energy, in particular the impact of its activities on the safety of using hydroelectric power plants, also in terms of their impact on the environment - [K_K02++, K_K04++]

Assessment methods of study outcomes

Lecture:
- Assessment of the knowledge and skills listed on the exam grading,
- Continuous evaluation for each course (rewarding activity and quality perception).

Class project:
- Final evaluation of the project on a small hydroelectric project,
- Assessment of current progress on the project, as well as active participation in the classes.

Get extra points for the activity in the classroom, and in particular for:
- Propose a discussion of additional issues issues;
- The effectiveness of the application of the knowledge gained during solving the given problem;
- Care and aesthetic design of the project.

Course description

Methods exploit the potential of energy of water. Overview of the largest operating hydroelectric power plants in Poland and abroad. The basic parameters of hydroelectric power. The types of plants and types of water turbines. Rules for selection of turbines. Wiring diagrams and hydroelectric facilities. Advantages and disadvantages of small and large hydro. Construction and design principles of small hydropower.

Basic bibliography:

1. Ciok Z. "Ochrona środowiska w elektroenergetyce", Wydawnictwo Naukowe PWN, Warszawa 2001.
2. Gronowicz J."Niekonwencjonalne źródła energii", Wydawnictwo Instytutu Technologii Eksploatacji ? PIB, Radom ? Poznań 2010.
3. Karolewski B., Ligocki P. "Wyznaczanie parametrów małej elektrowni wodnej", Prace Instytutu Maszyn, Napędów i Pomiarów Elektrycznych Politechniki Wrocławskiej, 2004, nr 56.
4. Klugmann-Radziemska E. "Odnawialne źródła energii; przykłady obliczeniowe", Wydawnictwo Politechniki Gdańskiej, Gdańsk 2007.
5. Lewandowski W. M. "Proekologiczne odnawialne źródła energii", Wydawnictwa Naukowo-Techniczne, Warszawa 2007.
6. Steller J., Henke A., Kaniewski M. "Jak zbudować małą elektrownię wodną? Przewodnik inwestora", Europejskie Stowarzyszenie Małej Energetyki Wodnej (ESHA), 2010.

Additional bibliography:

1. Tytko R. "Odnawialne źródła energii", Wydawnictwo OWG, Warszawa 2009,

Result of average student's workload

Activity	Time (working hours)
1. participation in lectures	9
2. participation in project classes	9
3. participate into consultations concerning the lecture	2
4. participate into consultations concerning the project classes	5
5. implementation of the project	22
6. prepare for the exam	18
7. completion of projects	2
8. participation in the exam	2

Student’s workload

Source of workload	hours	ECTS
Total workload	69	3
Contact hours	29	1
Practical activities	38	1